

Claims

- [c1] What is claimed is:
- 1.A method for optimizing a playout delay of packets being transmitted within a network, said packets comprising data for playout, said network having a network delay of packet transmission, the method comprising:
 - (a)detecting a packet communication mode, wherein packet communication modes comprise a full-duplex mode and a half-duplex mode;
 - (b)calculating a playout delay for a current packet based on the detected packet communication mode; and
 - (c)delaying playout of the current packet by the calculated playout delay.
 - [c2] 2.The method of claim 1 wherein in (b) when the packet communication mode is detected to be the half-duplex mode, the calculated playout delay for the current packet is longer than when the packet communication mode is detected to be the full-duplex mode.
 - [c3] 3.The method of claim 1 further comprising:
 - (d)calculating a mean network delay variance for the current packet; and
 - (e)determining an estimated jitter for the current packet referencing the mean network delay variance;
 wherein in (b) the playout delay for the current packet is calculated further based on the estimated jitter for the current packet and playout delays of previous packets.
 - [c4] 4.The method of claim 3 wherein in (b) when the packet communication mode is detected to be the half-duplex mode, the calculated playout delay for the current packet depends less on the playout delays of the previous packets than when the packet communication mode is detected to be the full-duplex mode.
 - [c5] 5.The method of claim 3 wherein in (b) when the packet communication mode is detected to be the half-duplex mode, the calculated playout delay for the current packet depends more on the estimated jitter for the current packet than when the packet communication mode is detected to be the full-duplex mode.
 - [c6] 6.The method of claim 3 wherein the estimated jitter for the current packet as

determined in (e) further depends on a scaling factor that is set according to the packet communication mode as detected in (a).

[c7] 7.The method of claim 3 wherein calculating a playout delay for the current packet in (b) further references a smoothing factor that is set according to the packet communication mode as detected in (a).

[c8] 8.The method of claim 1 wherein the playout of the packets is for a voice over Internet protocol (VoIP), videophone, on-line game, and other real-time interactive communication.

[c9] 9.The method of claim 1 wherein the network is a computer network or a radio transmission network for wireless phones.

[c10] 10.A communications device for playing data contained in packets with an optimized delay, said packets comprising data for playout, said network having a network delay of packet transmission, the playout device comprising:
a playout buffer for receiving and buffering packets;
a playout controller for determining playout delays of packets from estimated network delays and a packet communication mode, and for controlling the playout buffer according to the playout delays;
a network delay estimator for calculating estimated network delays of packets and sending estimated network delays to the playout controller; and
an active detector for detecting the packet communication mode, wherein packet communication modes comprise a full-duplex mode and a half-duplex mode.

[c11] 11.The communications device of claim 10 wherein when the active detector detects the packet communication mode is the half-duplex mode, the playout controller calculates a playout delay for a current packet as longer than when the active detector detects the packet communication mode is the full-duplex mode.

[c12] 12.The communications device of claim 10 wherein when the active detector detects the packet communication mode is the half-duplex mode, the playout controller calculates a playout delay for a current packet as depending less on

playout delays of previous packets than when the active detector detects the packet communication mode is the full-duplex mode.

[c13] 13.The communications device of claim 10 wherein when the active detector detects the packet communication mode is the half-duplex mode, the playout controller calculates a playout delay for a current packet as depending more on an estimated network delay for the current packet than when the active detector detects the packet communication mode is the full-duplex mode.

[c14] 14.The communications device of claim 10 further comprising:
a receiver through which the playout buffer receives packets from the network;
a media output device to which the playout buffer outputs packets;
a media input device for receiving packets; and
a transmitter through which the playout device sends packets to the network.

[c15] 15.The communications device of claim 10 wherein the media output device is a voice over Internet protocol (VoIP) player, videophone, on-line game, and other real-time interactive communication device.

[c16] 16.The communications device of claim 10 wherein the network is a computer network or a radio transmission network for mobile phones.